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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SULPHUR FREE COMPOSITION AND LUBRICANT COMPOSITION AND METHODS THEREOF

(57) Abstract: A composition comprises a sulphur free reaction product of: (a)(i) a hydrocarbyl substituted aromatic compound containing an acidic group selected from the group consisting of a carboxylic group, a hydroxyl group and mixtures thereof; and (a)(ii) an organic nitrogen-containing base reacted with the acidic group. The composition is obtained by a preparatory process and is useful in a method for lubricating an internal combustion engine to include where the lubricant has reduced levels of sulphur, phosphorus and sulphated ash.

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# INTERNATIONAL SEARCH REPORT

International Application No  
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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C10M159/12 C10M145/20 C10M149/14 C10M129/54 C10M133/12  
C10M133/14 C10M129/14 C10M133/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C10M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 688 751 A (CLEVELAND WILLIAM K S ET AL) 18 November 1997 (1997-11-18) cited in the application claim 1; examples 4-6,18,20	1-6,8,9, 12,16-20
X	US 5 827 805 A (ADAMS PAUL E ET AL) 27 October 1998 (1998-10-27) column 9, line 65 - column 13, line 19; claims 31,37; examples 12-15,27,28	1-5,9-20
X	US 5 330 666 A (HABEEB JACOB J) 19 July 1994 (1994-07-19) column 1, lines 41-44; claims 1-5 column 4, lines 3-21; examples 1,2	1-6,8,9, 11,14-20
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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- \*P\* document published prior to the international filing date but later than the priority date claimed

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- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- \*G\* document member of the same patent family

Date of the actual completion of the international search

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International Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 290 463 A (HABEEB JACOB J) 1 March 1994 (1994-03-01) the whole document column 1, lines 44-47; claims 1-12 column 3, line 64 - column 4, line 21; examples 1,2	1-6,8,9, 11,13-20
X	US 4 090 971 A (HOKE DONALD IRVIN) 23 May 1978 (1978-05-23) column 2, line 52 - column 5, line 10 column 10, lines 38-56 column 12, lines 11-26 column 15, lines 10-42; claims 1,4; examples 1-9,12,13	1-6,8-20
X	US 3 362 801 A (FARERI ELIZABETH L ET AL) 9 January 1968 (1968-01-09) the whole document	1,3,6,8, 9,16-18
X	US 5 089 158 A (VAN KRUCHTEN EUGENE M G A ET AL) 18 February 1992 (1992-02-18)  column 4, line 42 - column 5, line 21; examples 1,2; tables 1-4	1-4,6,8, 9,11,12, 16-20
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X	GB 455 304 A (DU PONT) 19 October 1936 (1936-10-19) page 3, lines 17,18,58-70	1,6,16
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X	US 6 331 510 B1 (LAMB GORDON D ET AL) 18 December 2001 (2001-12-18) column 11, line 22 - column 12, line 15; claim 1	1-3,6,9, 16-20
X	DD 264 446 A (LEUNA WERKE VEB) 1 February 1989 (1989-02-01)  claims 1,4,7,9	1-3,6,9, 11,13, 16-19

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/001442

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,6(part),7(part),8-20,21(part),22

A lubricant composition comprising a sulphur-free reaction product of an organic N-containing base and a single or multiaromatic compound having both a hydroxy and a carboxylic acid group (claim 6: alternatives a(i)(1) and (3))

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2. claims: 1-5,6(part),7(part),9-20,21(part),22

A lubricant composition comprising a sulphur-free reaction product of an organic N-containing base and a single or multiaromatic compound having both an amino and a carboxylic acid group (claim 6: alternatives a(i)(2) and (4))

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3. claims: 1-5,6(part),9-20,22

A lubricant composition comprising a sulphur-free reaction product of an organic N-containing base and condensed phenol (claim 6: alternative a(i)(5))

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/001442

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